

BACKPACK ELECTROFISHING GUIDELINES

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Suggested protocol for the use of backpack electrofishing equipment in waters containing fish listed under the Endangered Species Act (ESA).

These recommendations should be seen as guidelines for developing consistent and safe electrofishing technique. It is hoped that these guidelines will ultimately help improve electrofishing technique in ways which will reduce fish injury and increase electrofishing efficiency.

Purpose and Scope

The purpose of this document is to recommend guidelines for using backpack electrofishing equipment to sample ESA-listed fish. Because electrofishing can kill or severely injure fish, every effort should be made to avoid electrofishing and use snorkeling or other fishery information collection techniques. Where electrofishing is the only suitable sampling method, these guidelines are suggested to help reduce the number of fish killed or severely injured.

These guidelines are concerned only with studies that involve electrofishing juvenile or adult salmonids that are *not* in spawning condition. Electrofishing in the vicinity of adults in spawning condition or operating equipment in the vicinity of redds containing developing eggs is not discussed as there is no justifiable basis for permitting these activities near listed species.

Also, these guidelines do not deal with factors such as temperature or fish handling technique both of which can significantly affect fish health during an electrofishing session. None the less, all ESA-listed fish must be sampled with extreme care. The field crew must carefully design the sampling sessions to minimize fish stress by working within favorable temperature regimes, using anesthetics when necessary, and minimizing the time the fish are held before release. As with all fieldwork involving live ESA-listed fish, the best science should be used along with an experienced crew and good equipment in order to minimize handling stress.

Equipment

Equipment should be in good working condition. Operators should go through the manufacturer's preseason checks, adhere to all provisions, and record major maintenance work in a log.

Training

A crew leader having at least 100 hours of electrofishing experience in the field using similar equipment should train the crew. The crew leader's experience must be

documented and available for confirmation; such documentation may be in the form of a logbook. The training should occur before an inexperienced crew begins any electrofishing; it should also be conducted in waters that do not contain ESA-listed fish.

The training program must include the following elements:

1. Definitions of basic terminology: e.g. galvanotaxis, narcosis, and tetany.
2. An explanation of how electrofishing attracts fish.
3. An explanation of how gear can injure fish and how to recognize signs of injury.
4. A review of these guidelines and the manufacturer's recommendations.
5. A demonstration of the proper use of electrofishing equipment, the role each crew member performs, and basic gear maintenance.
6. A field session where new individuals actually perform each role on the electrofishing crew.

Specific Electrofishing Guidelines

The following guidelines are recommended for all electrofishing sessions.

1. Coordinate research activities with fishery personnel from other agencies to avoid duplication of effort and unnecessary stress on fish. In order to avoid contact with spawning adults or active redds, carefully survey the area to be sampled before beginning electrofishing.
2. Measure conductivity and set voltage as follows:

<u>Conductivity (umhos/cm)</u>	<u>Voltage</u>
Less than 100	900 to 1100
100 to 300	500 to 800
Greater than 300	150 to 400
3. Only direct current (DC) should be used.
4. Each session should begin with pulse width and rate set to the minimum needed to capture fish. These settings should be gradually increased only to the point where fish are immobilized and captured. Start with pulse width of 500us and do not exceed 5 milliseconds. Pulse rate should start at 30Hz and work carefully upwards. *In general*, exceeding 40 Hz will injure more fish.
5. The zone of potential fish injury is 0.5m from the anode. Care should be taken in shallow waters, undercut banks, or where fish can be concentrated because in such areas the fish are more likely to come into close contact with the anode.
6. The stream segment should be worked systematically, moving the anode continuously in a herringbone pattern through the water. Do not electrofish one area for an extended period.

7. Crew should carefully observe the condition of the sampled fish. Dark bands on the body and longer recovery times are signs of injury or handling stress. When such signs are noted, the settings for the electrofishing unit may need adjusting. Sampling should be terminated if injuries occur or abnormally long recovery times persist.
8. When the sampling design involves taking scales and measurements, a healthy environment for the stressed fish must be provided and the holding time must be minimized. Water to water transfers, the use of shaded, dark containers and supplemental oxygen should all be considered in designing fish handling operations. For these operations, additional crewmembers who are experienced in holding and processing stressed fish may be necessary.
9. Whenever possible, a block net should be placed below the area being sampled to capture stunned fish that may drift downstream.
10. The electrofishing settings should be recorded in a logbook along with conductivity, temperature, and other variables affecting efficiency. These notes, together with observations on fish condition, will improve technique and form the basis for training new operators.